THE VETERINARY RECORD

FOUNDED BY WILLIAM HUNTING, F.R.C.V.S., 1888.

No. 39 SEPTEMBER 28, 1946 VOL. 58.

Rational Breeding Methods for Livestock Improvement *

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I was particularly pleased to accept your Honorary Secretary's invitation to address you here, for two reasons. One is a sentimental reason. It is now just about 21 years ago since I was invited by the late Professor Gilchrist to give a short series of lectures to the agriculture students on genetics in relation to animal breeding. Those lectures were given in this room—and though the walls may have ears, I trust they have no memory!

In those days genetics was a young, a very young, science; as one of its recruits I was no doubt optimistic and tried to give a glowing picture of the possible applications of genetics in livestock improvement. In these 21 years, however, while there have been relatively few changes in the fundamental, elementary principles of genetical science, there have been very considerable changes in outlook regarding their application. These lead to a positive view of stock improvement. And there lies my other reason for appreciating your invitation to join you this afternoon. I believe I am right in recognizing the emphasis you, as a professional association, place upon a positive conception of animal health and therefore of an improved and biologically efficient livestock industry. I hope that I can indicate some of the ways in which the genetical concepts of stock improvement closely interlock with yours and reveal essential components of what might be called the technical structure of animal production.

In this respect, it is fair to say that we are all concerned with animal populations; the individual animal is a member of a herd, the herds form breeds or types, those in turn form the livestock population. The individual animal is a sample of the genetic make-up of its breed or type; groups of animals are collections of samples of gene populations, in which some genes may have well marked effects, while some characteristics may depend upon complicated gene interactions. Hence, in so far as variation in characters is dependent upon genetic influences, the problem of stock improvement involves questions of the frequency of desirable and undesirable genes and their distribution or dispersion throughout a population or group of animals. Character variation provides the raw material for selection, for improvement or change in any direction; methods of mating influence the way in which gene combinations can be built up and distributed throughout a group of animals. This view does not preclude from consideration the great part that environment can play in giving rise to character variation. Not at all. It recognizes and emphasises the importance of environment modifications and of the ecological background to stock breeding problems. It enables us to take a more objective and realistic attitude regarding the rôle of breeding methods and practices in achieving any particular form of improvement, and to examine more clearly the claims made for any stock breeding policies and systems.

Now a great deal of attention has been given to the occurrence of defects and abnormalities which affect performance or even cause death. I have with me a list of inherited defects in cattle which records between 60 and 70 conditions of this sort that are inherited and nine more that are probably inherited. (It is the intention of the Imperial Bureau to publish similar consolidated lists of these conditions in the major farm stock when opportunity permits.) Altogether they represent a definite, though fortunately not heavy, source of loss to the cattle industry. There are probably many more, not yet identified, which collectively might constitute a serious wastage and form a drag upon high performance of the industry as a whole. Indeed, I am assured by my friend Dr. Greenwood that, in poultry breeding, recognition of semi- and sublethals, such as nephritis and congenital heart disease, with a knowledge of their inheritance, would go far to solve many of the problems of low production, heavy mortality and loss which beset the poultry industry. And I might add that many of these defects are of great scientific interest in that they are yielding important information on the physiological action of specific genes. Fourie's studies of porphyrinuria in South Africa are a case in point.

To introduce, however, the population approach, let me discuss some features of the testicular and ovarian hypoplasia found among Swedish Highland cattle, as recently studied by Eriksson. This is a breed which is relatively small in numbers, and which forms a fairly discrete population of about 6,000 head. Measures for improvement have been applied over a comparatively short period of time; State-subsidized prizes date from 1892, recording societies from 1900, bull breeding centres from 1905 and auction sales of breeding stock from 1908. As improvement proceeded, grave disturbances in fertility occurred, until in 1935 about 25 to 26 per cent. of all the animals in the improved section of the breed were affected by hypoplasia of the gonads. This was a staggering proportion, especially when it is obvious that some selection against the defect was in a sense automatic, as when both gonads are affected the animal is sterile. The infertility was due to a recessive gene with incomplete penetrance. From 1935 active measures were adopted to overcome the disaster which threatened the breed. Hypoplastic bulls were culled; they were not admitted to registration, could not be sold at auction, and their slaughter was subsidized from 1937. With the cows the situation was different; if affected cows had been drastically culled, there would not have been enough high-producing cows left to provide a sufficient number of young bulls for breeding purposes. Hence, in the early stages, culling among the cows was on a voluntary basis, but by 1942 the frequency had been reduced to below 8 per cent., so that for 1943 and onwards affected cows were prohibited as bull breeders.

In this case selection against the defect could produce fairly rapid results at first—the future progress will be slower. But another step was taken to aid progress—the population was later "opened" and a few hypoplasia-free bulls of other breeds were used. Another noteworthy feature of this case is that though the population was closed at first, and numbered only about 6,000 animals all told, the amount of inbreeding carried out had not been great. Nevertheless, the genetic relationship of the breed to one of the two bulls mainly responsible for the spread of the defect was fairly high. Thus, this example gives us the population aspect regarding questions of breed numbers, closed *v.* open populations, breeding systems, and isolating mechanisms. Further, since this was a simply inherited character, fairly easily recognizable, it opens up also, in the second place, the general question of procedures when more complex and less strongly inherited characters are concerned.

Let us take the first group of topics, though discussion of the two groups must necessarily overlap to some extent. Since individuals are just samples of their breed's general genotype and since inheritance is a matter of sampling, the limits within which breeders can work are important. A breed or a group of cattle can be isolated to a greater or less degree from other groups by various mechanisms. Complete isolation, such as arises from closed herdbooks or closed herds, severely restricts the choice of breeding animals and hence the choice of genes on which to base selection and breeding policies. A breeder has to make do with what he has got in the way of a stock of desirable and undesirable genes, and if that stock is small, genetic constitution will tend, owing to gene sampling, to drift in ways beyond his control. He cannot bring in fresh genes to give him a fresh basis of variation on which to work. Deliberate selection is severely handicapped.

Other mechanisms are not so drastically isolating in effect. For example, open herdbooks allow fresh genes to contribute to available variation, but the grading up process, requiring so many top-crosses of fully pedigreed bulls, tends to reduce the contribution from outside the breed. Attestation and such devices restrict access to wider sources of breeding material; milk recording schemes act similarly, though they provide at the same time means of increasing accuracy of selection; geographical considerations may restrict opportunities for migration of stock; while the dictates of fashion may also in practice remove some of the freedom of choice of breeding material, as well as adding so much to the complex of characters to be considered that the intensity of selection that can be applied to any one of them is reduced. Further, within a breed, there may be such divergences of breeding aims that breeders who have any one objective in view are effectively cut off from using

* Presented to the North of England Division, N.V.M.A., at King's College, Newcastle-on-Tyne, June 28th, 1946.

a considerable amount of the existing variation in the breed as a whole.

Before going on to the second general question of breeding procedures—and at the risk of restating what may be quite familiar to many of you—I wish to carry this matter of limitations a stage further and deal briefly with some of the difficulties which arise from the very structure of our breeding industry. Fortunately, in relation to conditions in Great Britain we can draw on the studies of my colleague, Dr Donald, to get them in perspective. He estimates that in 1939 between 3½ and 4 per cent. of all the cows in-calf or in-milk (and heifers in-milk) in Great Britain were pedigreed. The average size of pedigree herds, on the basis of female stock, is small, and within the breeds there is a great preponderance of very small herds. For instance, in the Red Poll breed with one of the highest average herd sizes (42 in 1939), 62 per cent. of the herds had less than 40 females of all ages. In general, about 50 per cent. of pedigree herds contain less than ten cows. On such grounds alone the average pedigree breeder has to resort to outcrossing and therefore to frequent sampling of bulls and their genotypes. Moreover, small herd size means great difficulty in carrying out satisfactory progeny testing. When to such considerations is added that of the length of time during which the average herd remains as a unit in which a breeding policy can be carried out, the position regarding these limits is very real and is serious. For example, if we take the average generation interval in cattle as being about four to five years, then it is seen that an average herd duration of 17 years such as occurs in the Ayrshire breed amounts only to about four generations of stock and therefore gives little opportunity for consistent selection and breeding policies to be effective.

Obviously, we must have, if possible, greater precision in our selection and breeding methods if we are to expect progress, especially in regard to performance characters of economic importance, which, in contrast to the defects and abnormalities I mentioned earlier, are usually weakly inherited and strongly affected by environment. With them there are two components of the variation existing at any time, the genetic and the environmental, and in the very first instance we need to be able to assess, so far as we can, the relative contributions of each set. Quite often we can plot a curve of increasing productivity throughout the years which seems to show real genetic gains spread over a producing population (*e.g.*, for fleece weight in New South Wales), but equally often we will be misled unless we take fully into account the developments of husbandry that have also taken place. For example, few of us here would deny the great prospects of improved average milk yield which could arise from better all-round management, husbandry and feeding and disease control. That would give us probably 100 gallons a head more, quickly and economically, but would not involve any appreciable genetic gain, unless the genetic ceiling and the proportion of animals approaching it were also raised.

There is good evidence for stating that as the environmental level is raised, inherited variation becomes relatively more important. I prefer to put the situation that way because I believe the other contention—that the best possible environment must be created for selection—is overstating the case. If the environmental level is raised, we reach a ceiling fixed by inherited capabilities. This ceiling value may be above that which is most suitable on economic grounds. Admittedly, genetic potentialities cannot be expressed if the environment is unfavourable. Between these two conditions there are production levels that can be raised by selecting the animals which are capable of responding to higher levels of husbandry or can give higher performance under the existing conditions.

In this connection Bonnier's work on identical twins in Sweden is of fundamental importance, and I am fortunate in having Professor Bonnier's permission to quote some of his unpublished conclusions. One member of each pair of twins was kept on a low level of nutrition for 27 months, the other received practically double the amount of food. By comparing the low level (minus) group with the high level (plus) group, it appears that at every stage of growth up to 27 months each animal has an inherited maximal growth rate, which she can fully attain if she gets sufficient food. If she gets less, she grows more slowly; if she gets more, the surplus food is wasted for growth, though fat deposition may occur. Some of his twin pairs of heifers have been carried through their first lactations, the nutritional level of both plus and minus animals having been standardized for their weights and milk yields. Comparison of the fat and protein percentages in the milk during the first 36 weeks of lactation leads to the conclusion that towards the end of the period the differences are smoothed out, the plus animals progressively losing their early advantages in fat and protein percentages which have come from their greater nutritional reserves. However, when the various pairs of twins are compared for total milk production and for bodyweight changes during 36 weeks of their first lactation, it emerges that what the plus twin has in surplus milk production capacity, her sister has in growth capacity. As Professor Bonnier puts it in a recent letter to me, "Growth has a priority to the food, and therefore the minus animal uses relatively more food for growth than does her plus sister, which instead uses more for milk. The total amount of production, which is approximately equal for the two twins, is a measure of their genetically fixed capacity of production."

The problem, in general terms, of making genetic gains in productive capacity becomes that of being able in the first instance to identify and select the animals with high genetic potentialities and high breeding worth and then to use these animals efficiently. It is here that we come up against the second group of questions I mentioned earlier—methods of selection and the low heritability of characters such as milk yield and butterfat production. With the latter in mind we are forced to take a realistic view. As yet we have no definite estimates made in this country of the heritability of milk yield, but from work in other countries we can use a figure of somewhere between 30 and 40 per cent. heritability for butterfat production. Using such a figure, say, 30 per cent., we can make a rough estimate of the rigour of selection which would have to be applied. Take, for example, an average milk production of 500 gallons. To raise it to a genetic level of 560 gallons we would have to select as parents animals with a potential production of 700 gallons. That gives us an idea of what we should reach for in order to gain a given amount. But—that is for both parents; if we can select only among one sex, then the gain due to inheritance is only about half of that proportion, only some 15 to 20 per cent. of the differences between dams being inherited. The dams to give this gain of 60 gallons on 500 would need to be only those producing 900 gallons.

Obviously, the improvement by selection from high-producing cows is bound to be slow. Yet it would not be unreasonably slow if the high-producing cows could give us all the replacement calves that we required. However, as you well know, the general level of wastage is so high among our dairy herds that the average life of a dairy cow is not more than about four lactations, equivalent to her leaving two heifer calves, which with wastage among calves means that we can only, on the average, select among our cow population to a very small extent indeed. A good proportion of our replacements must still come from low-producing dams. A lengthened average working life of our dairy cows, even by two lactations, would go far to help this situation, as well as giving in itself higher average production owing to the increased proportion of mature milking cows in the population and reducing the number of young stock which would have to be carried for replacements.

What about the other parents, the bulls? The estimates of heritability I have just quoted give us the direction in which we should aim and an idea of the margins which we should allow for appreciable genetic gains. Once again we have little definite data for conditions in this country, but there are suggestive figures which should provide stimulus for bull breeders. The bull licensing returns show us something of the general trends favouring certain dairy breeds, but before we can be entirely confident that real genetic progress is likely to be achieved, we need more evidence of the real genetic superiority of the stocks from which large numbers of our bulls are bred. In this regard, production surveys such as those recently summarized for Hertfordshire can give us part of the background, but only part until more precise information becomes available from the Milk Marketing Board. (You may remember that those Hertfordshire figures credit 117 pedigree herds out of a total of 768 herds with an average advantage of less than 20 gallons over the general average of 568 gallons per cow.)

We can advance only step by step, but the more positive the steps the better. Here lies the argument for introducing more positive features into the bull licensing schemes—and I would refer you to an article by Dr. Donald in *The Veterinary Record* of September 23rd, 1944, which presents a factual analysis of the situation regarding the supply of pedigree bulls in relation to bull licensing in this country.

The same question of heritability of production characters enters into the situation. When characters are weakly inherited, the only satisfactory method of discounting environmental modifications and of determining breeding merit is the full use of the progeny test. But under present circumstances many bulls are disposed of, or die, before they are adequately tested. The fact that it takes time to progeny test a bull will always be a difficulty, but there is no doubt that at present too many young bulls are perforce used. This is illustrated, for example, by the fact that among pedigree Ayrshire cattle in the 1940 herdbook the average age of sires at the time their daughters conceived was 39·7 months (the average age of the dams being 48·8 months—and this also emphasizes and adds to the difficulties inherent in the high wastage rates and short productive lives of the cows).

The use of bulls of proved breeding merit as determined by the progeny test would of course restrict the numbers of bulls available. How much so is possibly indicated by New Zealand data which show that only about one bull in three is capable of producing any improvement at all, while only about one in ten can be regarded as an outstanding improver. There is thus a considerable wastage not only of time but also of breeding stock involved in the actual testing of bulls. But there are ways of bringing a degree of safety into the selection of young animals, namely, by using other criteria in the form of performance pedigrees. A good example of such a direct application of selective registration is to be found in the schemes now operating in the American Ayrshire breed. Two kinds of performance pedigree are recognized. Briefly, the requirements are that for an animal to have a "Preferred" pedigree its sire and dam must be approved, or meet certain closely allied standards, while a "Selected" pedigree must show approved production in at least one, usually two, of the parents and grandparents, but no evidence of low production anywhere among the six immediate ancestors. Three out of every four bulls with "Preferred" pedigrees, and two out of three with "Selected" pedigrees, have been shown to make good. The "Selected" pedigree has a practical advantage in that it allows recognition to sons of young bulls and of heifers not yet fully proved.

Realistic evaluation of pedigree on these lines is a promising technique, especially if the modern methods of analysing pedigrees, *per se*, are used in conjunction to examine the effects of the mating systems carried out in the preceding generations. By these methods we can, for instance, judge whether there has been sufficient inbreeding over a number of generations to establish anything of a genetically uniform family or strain. This is important, because for weakly inherited characters selection on a family basis is more satisfactory than selection on an individual basis. But we must have families in the genetic sense—meaning families of closely related individuals—not families in the nominal sense of tail male or tail female.

The main disadvantages of inbreeding are most likely to be manifested in small herds or groups; for the larger units, such as breeds, it is entirely reasonable to say that not enough use has been made of the method to give full play to its advantageous results, particularly those of establishing prepotency, revealing rare, undesirable recessives so that they may be culled, and forming distinct and uniform families. Moreover, a certain amount of inbreeding is essential to keep high genetic relationship to an outstanding ancestor.

In this last respect we have, of course, the main use of deliberate line-breeding which can, in practice, be carried out without any close inbreeding. Line-breeding is the most effective mating system we have for ensuring that the genetic constitution of a superior animal is recapitulated among his descendants, that is, for spreading the influence of a desirable beast throughout a large group of animals, once the superiority of that ancestor has been recognized by suitable tests of performance and breeding merit. It gives us the practical opportunity of applying selection on performance as well as on relationship, whereas in inbreeding close relationship may have often to count for more than performance merit. As compared with inbreeding, line-breeding gives greater "elbow room" in numbers and for selection, and tends more slowly to set up uniform families or strains of virtue in themselves or for combining with other strains.

These considerations apply directly in the so-called pure breeds, or within the pedigree sections of our breeds. We are sometimes apt, perhaps, to attribute genetic worth to "pedigree" as such, without conceding that it is in the first instance only a means of isolating one group of animals from another. Wherever a group, be it a family, or a herd, or a breed, is distinguishable on the grounds of genetic and performance merit, grading up towards it is a justifiable policy provided that its genetic ceiling and environment are appropriate to the larger group. But progress depends upon the difference in ceilings between the "improver" and the unimproved types; if that of the former is not continuously stepped up, or cannot be stepped up, then the margin between the two soon diminishes and "grading up," as such, becomes ineffective.

You will appreciate, I feel sure, why I have dealt somewhat extensively with selection. Its scope and limitations must be fully recognized, as well as the fact that selection in itself cannot lead quickly to improvement by way of affecting gene frequency. Changes in gene frequency also result from the mating systems employed. Rational breeding methods to secure genetic improvement must therefore involve appropriate selection technique *plus* suitable mating systems. The prime necessity is obviously a definite breeding aim, and we can perhaps best judge the real progress made by considering as objectively as possible the situation in respect of selection methods, selection limits, mating systems, breeding policies, and the structure of the breeding population, together. But in order to maintain a reasonably balanced view of the whole situation, it is also essential to keep well in mind that efficiency of performance should be judged relatively to the genetic ceiling as well as to the levels of husbandry and environment. Before we can know how far we have got along the road of stock improvement, or even which way we are really going, much data has yet to be gathered, obviously from many different fields of study. The integration not only of ideas but also of the technical experience of veterinary scientist and practitioner, animal husbandman, geneticist, and breeder is certainly essential to give us a working knowledge of what we can reasonably reach for, and how much of that we can surely gain.

Two Outbreaks of Salmonella dublin Infection in Adult Cattle

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During the last six months two dairy farms in the West Midlands have had cases of disease which in many respects show a similarity to the outbreaks of *Salmonella dublin* infection recently described by John (1946). Ten in-calf heifers or cows in a herd of dairy Shorthorns in Shropshire died during the autumn of 1945, and two fatal cases were encountered in a Friesian herd in Staffordshire during the winter of the same year.

Epidemiology. In the Shorthorn herd none of the ten cases appeared concurrently and the shortest interval between any two cases was one week. All the affected cattle were out at grass at the time of the onset of symptoms, and cattle on this part of the farm were watered from a stagnant pit. No similar cases had ever been seen on this farm, but during the summer of 1945, six in-calf heifers were bought from S. Wales. While conclusive evidence is not available, the history of these cattle on the farm suggests that they may have introduced the disease and infection may have been transmitted by contamination of either the grass or the water. These heifers arrived on the farm at the beginning of July and on August 1st one died but was sent off the farm without *post-mortem* examination. A second animal aborted on October 30th and was unfortunately sold without examination; it was a few days after this that the first of the home-bred cattle became affected. In the Friesian herd the only two cases up to date have occurred at an interval of over two months and both have been cows in milk which were not out at grass at the time when symptoms were first seen.

Symptoms and Course of the Disease. These were largely similar to the description given by John, except that all cases terminated fatally. A maximum temperature of up to 104°, falling to subnormal as the disease progressed, was fairly typical and this was accompanied by coldness of the extremities and very intense depression. On both these farms the affected cattle passed blood in the faeces in the form of streaks mixed with mucus, or as small clots, but this tended to disappear after the first 20 to 24 hours and was followed by intense diarrhoea, sometimes accompanied by slight straining but later becoming quite effortless. Death invariably followed within a further three to four days preceded by coma for the last few hours, but abortion only occurred in one case, which is not surprising in view of the rapid course of the disease, although most of the Shorthorn cows and heifers were pregnant at the time. Two of the detailed cases described by John aborted at ten days and 20 days after the onset of symptoms, respectively, but both these animals eventually recovered.

Control Methods. Blood samples were obtained from all adult animals in both herds and subjected to the agglutination test using a suspension of *S. pullorum*. The "O" antigens of *S. pullorum* and *S. dublin* have much in common and the following results were obtained:—

Table showing maximum titre at which complete agglutination occurred against S. pullorum antigen at initial blood test.

	Neg.	1:10	1:20	1:40	1:80	1:160	1:320	1:640	1:1280
Shorthorn herd									
No. of animals 19.1.46 ...	6	38	16	0	0	0	2	0	0
Friesian herd.									
No. of animals 5.3.46 ...	32	27	4	0	1	0	0	0	0

These figures suggested that in the Shorthorn herd two animals, Nos. 26 and 32, both showing titres of 1:320, should be regarded with suspicion and cultural examination of their faeces on to brilliant green—neutral red—lactose agar produced innumerable lilac-coloured non-lactose-fermenting colonies which on further examination were shown to be *S. dublin*. These two active "carriers," Nos. 26 and 32, are both home-bred animals and have shown no previous history of any illness at any time. They have had one and two calves respectively and were both pregnant at the time of blood testing. They are now confined in isolation and are being fattened for slaughter. A second blood test was made on 15.4.46 before turning the herd out to grass and no further high titres were obtained, but Nos. 26 and 32 still showed titres of 1:160 and 1:320 respectively and *S. dublin* was again recovered in large numbers from the faeces. In the Friesian herd faeces were examined bacteriologically from the five animals reacting between 1:20 and 1:80, but two such examinations at five weeks' interval were negative and it appears likely that there are no carriers at the present time in this herd.

DISCUSSION

There are a number of points arising from these two outbreaks which are of interest. First, the mode of introduction of the disease on to a farm can only be surmised in the absence of definite evidence, but in this connection Olson (1939) stresses the importance of a contaminated water supply and the possibility of *S. dublin* carriers among other species of animals, especially rats. A water supply which can be easily fouled by faeces can obviously be the medium by which infection is spread through the herd once it appears on a farm, but only under exceptional circumstances is it likely to be the initial source in itself. The position to date in the Friesian herd described above is that two animals have died from the disease at an interval of some two months and examination of samples of blood and faeces suggests that there is at present no carrier of the disease.

Secondly, the question arises as to whether there are strains of this organism which are pathogenic for adult cattle and not for calves and vice versa. *S. dublin* has been isolated from faeces in outbreaks of diarrhoea in young calves, and Craig, Davies and Massey (1941) have given a detailed account of such an outbreak occurring in this country in which it is stated that no carriers could be detected among the adult stock on the same farm by examination of samples of milk, blood or faeces. There has been no history of any epidemic or even isolated cases of scour among the calves on either of the two farms under discussion and in the case of the Shorthorn herd the calves have been reared for some four months in the loose box in which most of the deaths occurred and in which the one animal aborted. This box is built largely of old timber with a brick floor and thorough disinfection would be almost impossible, yet the calves have remained perfectly healthy.

Thirdly, the importance of the agglutination test as applied to the whole herd cannot be overstressed, since without it the Shorthorns Nos. 26 and 32 would have escaped detection and both these animals are definite carriers as shown by cultural examination of the faeces, although there has been no opportunity of studying the pathogenicity of the strains they are excreting. Recovered animals are, therefore, not the only carriers, since neither of these two heifers had ever shown any signs of the disease, which suggests that a blood test of the whole herd should be the first routine step in controlling an outbreak, once the disease has been diagnosed on a farm.

Acknowledgments.—The author would like to express his thanks to Mr. H. W. Steele-Bodger, Tamworth, and to Mr. G. Wyse, Oswestry, for their courtesy in permitting the publication of this article, and also to Dr. A. W. Stableforth for his report on the typing of the organism.

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Weekly Wisdom

Doctrinal orthodoxies of the present are no more than verdicts which triumphant, and at times unqualified majorities reached at some past moment of decision.—"Religion To-morrow" (Micklewright).

* * * * *

Villagers of South Kyme (Lincs.) were amazed recently to see a bull looking down on them from the top of their 14th century castle tower. To reach the summit the bull had climbed 100 stone steps of a narrow, spiral staircase, and was finally persuaded to descend by the manor gardener.

CLINICAL COMMUNICATION

Some Clinical Aspects of Cobalt Deficiency in Cattle

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Hitherto cobalt deficiencies have been studied against a known deficient nutritional background. That such a condition exists where one has no reasonable ground for suspecting a soil deficiency does not seem to have been well recognized. Widely distributed cases have been met over the last three years among cattle grazing on some of the most fertile of lowland areas only a few of which were found affected: the remaining stock appeared clinically normal. Cattle of all ages are involved, including stock bulls. The history is one of progressive emaciation; the course is protracted.

The symptoms of primary cobalt deficiency are fairly well defined. There is unthriftiness with an impaired or feeble appetite, loss of bodily condition and consequent atrophy of skeletal musculature; retention of the winter coat which is of poor lustre, yellowish tone, and patchy; the skin is lacking in resilience and in severe cases hard to the touch, with a dirty yellow layer of epithelial débris along the cervical region—particularly over the crest. The conjunctival mucous membranes, at first injected, become pallid. The abdomen is tucked up and the flanks are hollow. Gait is slower than normal, the animal being predisposed to rest for periods, during which the others remain grazing. Faeces may remain firm but more often are of a watery consistency. Sub-maxillary oedema may be present in cases where faeces are normal. Among breeding stock anoestrum and impaired milk yield are also recorded.

Over a period of three years, during which 84 cases were treated, the following was observed, which has been confirmed by a considerable number of cases, since treated by some of our neighbouring practitioners. Within two or three days of the commencement of treatment an improvement in gait and head carriage is noticed. Appetite sharpens, the faeces gradually become more solid, and the belly gradually drops, the flank becoming fuller. Periods of resting become shorter and the animal commences to eat and graze voraciously. Within ten to 14 days it begins to shed the over-long retained winter coat, epithelial débris clears away from the underlying skin, which becomes more supple, losing the hard leathery touch. In four to six weeks an animal previously ready for the knacker becomes a saleable beast, the outstanding feature being the rapidity of recovery, especially when the animal has access to pasture. Increased milk yield is recorded in the lactating female.

A cobalt deficiency is also associated with the secondary anaemia of parasitism as found in parasitic gastro-enteritis, and parasitic bronchitis.

Parasitic Gastro-enteritis.—In certain seasons a considerable number of young stock respond rather poorly to anthelmintic treatment and animals remain static for many weeks before any appreciable improvement can be noticed. Others become progressively weaker, and a terminal enteritis precedes death in coma. The administration of cobalt removes this lag phase and an almost immediate improvement is obtained leading to complete recovery. (310 cases.)

Parasitic Bronchitis or Broncho-pneumonia.—Oral administation of cobalt in such cases may produce within 24 to 48 hours a violent spasm of coughing which, lasting for twelve hours or so is, for the time being, rather distressing. This passes, leaving the animals with an increased desire for food and a generally brighter appearance. The paroxysms of coughing grow less frequent and the breath sweetens. This condition in store cattle one and a half years and over can be treated without displacing the intestinal worm load, but with severe cases in younger cattle better results are obtained by incorporating an anthelmintic; the results obtained by using phenothiazine and cobalt have been found more successful than phenothiazine alone. The anthelmintic is administered mixed with the first dose of cobalt sulphate solution, thereafter the second and subsequent doses of cobalt alone, being repeated as indicated further on.

The animals gain in strength, appetite improves more rapidly, bloom quickly returns to the coat, and the secondary infections of the respiratory tract resolve within a shorter time. Cattle may be treated at grass and left on "infected pastures." (320 cases.)

Treatment.—A stock solution is prepared by dissolving half an ounce of cobalt sulphate crystals in half a gallon (Winchester quart) of warm water. Dose—ten months and over—one fluid ounce followed by half an ounce every five days until at least four doses have been administered. At first the dose administered

was 60 c.c. or two ounces repeated at six- to eight-day intervals, but as time went on it was found that better results were obtained using the reduced quantity over the slightly shorter period, especially in the case of animals in very poor condition. The tolerance of such animals is rather low. Even though the amount administered in 60 c.c. represents 1/106 ounce of $CoSO_4$ $7H_2O$, continued dosage produced, in some, clinical manifestations of hypomagnesaemia if (*a*) the animal was housed and allowed no access to grass and (*b*) the animal was lactating. In others, during late autumn and winter, a transient improvement was followed by increasing debility—probably polycythaemia. As previously stated, these untoward sequelae were better avoided by reducing the dose.

These cobalt deficiency cases, which are most often seen during the spring, are also noted after periods of drought, when the flush of grass appears to set up a terminal enteritis causing these odd animals to become progressively weaker. A conservative estimate of losses in young stock from this condition during the spring and early summer of 1944 in this county was 400 to 500. Other factors are the necessary substitution of straw for hay with an insufficient quantity of roots fed accordingly. The disappearance of basic slag as a fertilizer, bran as a stable feeding-stuff and grazing of leys with insufficient attention to parasitism, appear to have some bearing on the condition. Where different breeds of similar age groups in one and the same herd were fed on similar rations the less hardy types were involved, *e.g.*, no clinical evidence could be detected in the Welsh Blacks whilst obvious cases were found among the more exotic dairy blends. Thus there seems to be some variation in individual basal metabolic requirements of cobalt.

Calves

Cobalt deficiency has been observed both among calves that have remained housed since birth and in others that have received access to pasture. Clinical manifestations may be grouped as under:—

1. Simple or primary with or without metabolic disturbance.
2. Associated with parasitism or secondary infection.

Symptoms in the early stages are those of slight unthriftiness and listlessness; distension of the abdomen may be present, the organ later becoming hollow. The appetite becomes capricious and even depraved; mucous membranes pallid; general development retarded. Progressive debility results in the animal remaining on the ground both unwilling and unable to rise, but generally continuing to eat anything within reach—fodder or bedding—pending the onset of death in coma. The alternative manifestation is hypomagnesaemia preceding death in spasm.

Secondary infections most. frequently found are those of the upper and lower respiratory tract and ophthalmia.

The course is variable, but of much shorter duration than that observed among older stock; the comparative number involved is greater than that seen among older age groups. The dams appear normal but the condition has some relation to the pre-natal diet.

Following an initial dose of half an ounce, treatment consists of oral administration of cobalt sulphate solution every five days—four doses or more S.O.S. *Dose* up to six months—two teaspoonfuls; six to ten months—three teaspoonfuls, during which, as has again been observed through the treatment of 62 cases, a marked improvement in appetite is soon apparent, the animals becoming more alert after a few days. The distended abdomen becomes reduced and the coats regain lustre. Resolution of secondary infection—provided the animals are not *in extremis*—is soon in progress. The animals subsequently grow good coats, which are rarely broken, with absence of epithelial débris. Hypomagnesaemia is effectively controlled (although treatment in such cases is extended to cover a period of two months, dosing at weekly intervals).

A few specimen cases are recorded. Comprehensive examination of faeces was kindly undertaken by Mr. W. T. Rowlands, Veterinary Investigation Officer, Bangor.

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Specimen Case Records

No. 1. Location—Lowland mixed farm—May, 1945.

Two-year-old Heifer and Two-year-old Bullock (*both Shorthorns*).—Two of a batch of 14 cattle wintered on premises, all turned out after anthelmintic treatment and doing well, apart from the two cattle which were brought in with persistent liquid faeces and progressive loss of condition. Anthelmintic treatment was repeated with no improvement. When seen ten days later, appetites were fickle, marked loss of condition, flanks hollow, abdomen tucked up, both animals very weak and mucous membranes pallid, faeces being of watery consistency. Comprehensive examination was negative. Tails badly stained—skin tight and winter coats retained. Treated and in three days appetites were improving, abdomen filling up, and animals brighter about the heads; faeces less liquid. Turned out in five days' time—uninterrupted recovery; faeces normal within ten days of first dose. Bullock sold as store in August for £26. Heifer retained and calved 1946—still lactating and in excellent condition.

Third Calver (*Shorthorn*).—Progressive loss of condition; liquid faeces; fickle appetite—March, 1946. Given three doses and not seen for three weeks. Faeces then firm; improved appetite; general appearance brighter. Turned out to grass in spring and doing well.

No. 2. Location—Upland store farm—April, 1945.

Three Yearling Heifers.—Part of a ten lot, other seven doing to owner's satisfaction. All were in good fettle when housed in late autumn, but the three had made unsatisfactory progress since January. Owner reported "they started to scour end of March." No response to anthelmintic treatment. Seen seven days after treatment—emaciated, hollow flanked and abdomen well up; tails stained, coats staring, appetites poor. Treated and seen seven days later—marked improvement, faeces firmer, bellies fuller. Coats covered with lick marks. Heads brighter, and eating all they were given. Turned out in May—uninterrupted recovery on grass. Disposed through the normal trade channels late summer.

Aged Roan Cow.—March, 1945. Emaciation; poor feeder; listless appearance; marked sub-maxillary oedema 9 in. by 4 in. by 3 in. Getting weaker every day. Faeces normal consistency and negative. Dosed, and seen in eight days, when oedema had resolved leaving only a dependent skin flap, a brighter appearance with appetite improving—better sheen on coat—calved and still lactating (15.7.46: 17 months).

No. 3. Location—Lowland farm (mixed)—March, 1946.

Second Calver.—Progressive emaciation. Liquid faeces last six weeks. Dry staring coat, fastidious and poor appetite. Treated. Faeces normal in 14 days. Turned out to grass in spring—doing and milking well.

No. 4. Location—Lowland farm (dairy)—June, 1944.

Two and a Half-Year-Old Heifer.—Aborted two months previously, poor condition, winter coat retained, liquid faeces, hollow flanks and abdomen tucked up, faeces negative. No response to anthelmintic or M'Fadyean's treatment (last six weeks). Treated. Faeces firmer in seven days', flanks fuller, animal more active and grazing hard. In 14 days' time faeces normal for time of year—tucked up appearance less marked, winter coat being shed. Retained over winter and sold as barren following spring.

No. 5. Location—Lowland dairy farm—June, 1944.

Two Two-Year-Old Heifers.—Unthrifty, no response anthelmintic treatment six weeks earlier, continued liquid faeces, hollow flanks and poor appetites; long periods spent resting whilst other cattle were grazing. Uninterrupted recovery following treatment—improvement noticed in three days' time, more active, grazing with fewer resting periods.

No. 6. Location—Upland (Attested)—April, 1944.

Two-Year-Old Bull.—Fair condition, fickle appetite, staring dull coat. Faeces normal. Hollow flanks, listless, cough. Treated. Paroxysms of coughing more severe and of greater frequency during 36 to 48-hour period, after which steady improvement maintained. Fourth day, appetite improved, cough less frequent, flank filling, brighter about the head and movement more brisk; uninterrupted recovery.

No. 7. Location—Lowland dairy farm (Attested)—March, 1945.

Two Yearling Heifers.—Unthrifty condition, dry patchy coats with marked yellowish-brown, crusty, epithelial debris. Poor feeders and poor doers; faeces normal and negative. Seven days after treatment noticeable improvement in appetite. Turned out to spring grass and when next seen were in beautiful bloom.

No. 8. Location—Upland store farm—June, 1944.

Herd history of two to three yearlings or two-year-olds lost for last five years; progressive emaciation, liquid faeces; sent to knackers. No response to anthelmintic treatment (no carcase available for *post-mortem* examination). Two heifers on premises were put on treatment, with uninterrupted recovery. Routine dosing of young stock through following two years was undertaken. No further cases have occurred.

The various age groups are seen among the first ten lots of stock treated during 1946, *viz.*: third calver in milk; barren heifer two years old; bullock two years old; dry cow eleven years old; first calver in milk; two-year-old bullock; seven bullocks, one and a half to two years; bullock two and a half years old; first calver in milk.

Calves

No. 1. Location—Lowland herd—self contained.

8.11.45.—Batch of calves (seven) four to six months old, unthrifty since birth, had been turned out to grass in October—no improvement. Coats staring and of poor lustre. Movements sluggish, abdomen tense in each case with marked distension in two cases. Dosed (20 c.c. given).

13.11.45.—Coats covered with lick marks. Cantered on field when let out: owner remarked he had never seen them do so previously. Hay rack empty; previously hay had been pulled out and wasted. Abdomen less tense in each case. Redosed.

17.11.45.—Exit from calf-box now riotous.

4.2.46.—In good order: not one broken coat.

No. 2. Location—Upland store farm.

26.10.45.—Nine-months-old Welsh bullock calf—history of being poor feeder and very unthrifty. Had experienced odd "fit or two." Turned out two months previously—no improvement. Coat badly broken. Scaly epithelial debris over shoulder and along neck. Mucous membranes pallid. Marked distension of abdomen. No inclination to move away and caught with ease. Dosed. Next seen 3.11.45. Complete absence of abdominal distension, grazing avidly, general appearance brighter.

28.11.45.—Doing well and agile.

No. 3. Location—Accredited dairy farm—lowland.

21.10.45.—History of two deaths some days previously. Carcases not available for *post-mortem* examination. Two others four months old, very weak, listless, coats staring, little or no appetite. Nasal discharge. Abdomen distended. Temperature normal. Dosed. Improvement noticed in 48 hours—uneventful recovery

No. 4. Location—Upland Attested mixed farm.

Herd history: Three to four deaths hypomagnesaemia and pneumonia every year for last four years. Season 1942–43 stores still on premises unsold. Very poorly developed and unthrifty lot—food allowance adequate. (Pasteurella vaccination undertaken for three years—no reduction in mortality rate but syndrome less marked.)

—.8.44.—Ten calves on premises; all coughing, nasal discharge, ophthalmia, general appearance of unthriftiness.

Dosed (full T.E. in this case). In 36 to 48 hours coughing spasm very much worse but gradually wore off by 72nd hour. (This phase has been avoided to a large extent by reducing the dose—the dose used for these calves was 30 c.c.) Appetites returned; nasal discharge and ophthalmia cleared up. No further deaths. Calves dosed each year and vaccination for pneumonia discontinued. Subsequent store cattle bred on premises from treated calves have sold well. No further deaths recorded.

(*Concluded at foot of col.* 1, *page* 428)

NOTES AND NEWS

Diary of Events

Oct. 3rd.—Annual General Meeting of the Central Veterinary Society at the Conway Hall, Red Lion Square, W.C.1, 2 p.m.

Oct. 8th.—Scientific Meeting of the Zoological Society of London, Regent's Park, N.W.8, 5 p.m.

Oct. 9th.—Meeting of the Editorial Committee, N.V.M.A., 2.30 p.m.

Oct. 11th.—Meeting of the North of Ireland Division, N.V.M.A., at Belfast (Queen's University), 2.30 p.m.

Oct. 16th.—Meeting of the Agriculture Group of the Society of Chemical Industry, in the Physical Chemistry Lecture Theatre, Royal College of Science, South Kensington. "An Experiment in Farming the Sea," Dr. F. Gross, Department of Zoology, University of Edinburgh.

Oct. 17th.—Meeting of the South-Eastern Division, N.V.M.A., at Maidstone (Royal Star Hotel), 2.30 p.m.

Oct. 19th.—Scientific Meeting of the Nutrition Society (Scottish Group), in the Strathcona Club, The Rowett Research Institute, Bucksburn, Aberdeen, 2.30 p.m.

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ANNUAL CONGRESS, N.V.M.A.

The 64th Annual General Meeting and its associated Congress, held during the past week at the Royal Veterinary College, London, was probably the most momentous gathering of the National Veterinary Medical Association since the General Meeting of 1919, when the N.V.M.A. was launched in its present form of a federated professional organization.

Expanding activities and responsibilities demand greater resources, and at this year's meeting, members were faced with the need to make a fundamental decision—for a financial crisis in the affairs of the Association has been reached—either to make an increase in the subscription to enable inevitably heavy future commitments to be met or to limit the work of the Association in the future to a considerable extent. Consideration of this vital domestic issue, however, was by no means the only factor lending special significance to this year's Congress, for the provision of virtually a full week of events in place of the attenuated programmes which perforce have had to serve since the eve-of-war meeting at Great Yarmouth, restored the gathering to its rightful place as a focal point in the life of the N.V.M.A.

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The necessary printing of this number of the Record in advance of Thursday's Annual Meeting, entails deferment to next week of our preliminary record of the decision of the members on the issues submitted to them. Nevertheless, and writing, as we must do, early in the week, it is clear that members and their ladies had made up their minds to make this year's Congress the occasion for a great post-war rally. The promise of a record attendance afforded by an unprecedented demand for tickets for the social functions—a demand which, much to the regret of the Provisional Committee, far exceeded the number it was possible to supply—gives every indication of fulfilment.

On Sunday, the Central Veterinary Society played the part traditionally assigned to the local Division of the Association, at the Conference Centre, of entertaining the newly gathered members and visitors. As the guests of the President and Fellows of the Society, they forgathered in the gardens of the Zoological Society in Regent's Park and spent a thoroughly enjoyable afternoon viewing that Society's collection and the horticultural features.

The hospitable reception provided an exceedingly pleasant interlude, Dr. and Mrs. Wooldridge receiving the guests in the deeply regretted absence of the President of the Society, Mr. S. F. J. Hodgman, through indisposition.

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Congress itself got off to an excellent start on the Monday morning, when the President, after welcoming the members and a considerable company of distinguished visitors, declared the Proceedings open. He then visited the hall housing the exhibition of drugs and surgical instruments and commended the representative and well-staged display to the attention of all present. Particular interest was attached to an exhibit of captured German and Italian veterinary instruments, kindly loaned by the Director-General, Army Veterinary and Remount Service.

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At the midday meeting of Council the President reported the receipt from the Ministry of Agriculture of an ultimatum that the Association should withdraw the publication of its refusal to accept advertisements of vacancies and its offer of advice to members who may consider applying for posts advertised elsewhere, for vacancies on the veterinary staff of the Ministry on pain of refusal to continue co-operation with the Association.

Council was unanimous in its view that the President and the Finance and General Purposes Committee be strongly supported in their determination not to alter the decisions made at its last meeting in regard to the dispute with the Ministry on status and salaries of the staff of the veterinary department.

In the afternoon the Grand Hall of the College was well filled, under the appropriate chairmanship of the Principal, Professor Buxton, to hear Dr. W. S. Gordon's paper "Advances in Veterinary Research," wherein attention was focussed on some of the diseases which have attracted the notice of research workers in recent years. In this paper and in the ensuing discussion, which was opened by Dr. H. G. Lamont, a wide field of accomplishment was reviewed.

By the evening, all late-comers having arrived, it was clearly evident at the President's Reception and Dance at the Dorchester Hotel, that the 1946 Congress of the Association was indeed in full swing. The popularity of the President and Mrs. Gould pre-ordained the success of this event, which provided a delightful social occasion for all who participated.

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The proceedings on Tuesday were pre-eminently the concern of the practitioners. Mr. T. Norman Gold, of Redditch, led off with his paper "Some Recent Advances in Veterinary Medicine and Surgery in Large Animals," with Mr. H. C. Swann of King's Lynn, effectively opening a useful discussion.

At the second session, Mr. W. L. Weipers, of Glasgow,

No. 5. Location—Lowland dairy farm.
—8.45.—Two four-months-old calves at grass. Unthrifty; no response to anthelmintic treatment. Poor appetites since birth; coats broken and dry. Abdomen distended. Undeveloped. Dosed. Seen six days later, when lick marks were plainly visible over both calves, which were grazing contentedly. Owner reported that three days after they had been dosed both displayed marked interest in their gruel bucket—previously they drank but little. Abdomen normal. Uneventful recovery.

took up the theme, as it related to small-animal practice, when Mr. Gordon C. Knight and Dr. R. F. Montgomerie also rendered good service as openers of another well-sustained debate. The interests of the practitioner were catered for further in the afternoon, for which a series of valuable demonstrations was provided.

As we print this issue, members attending Congress are paying their eagerly awaited visit to the Agricultural Research Council's Field Station at Compton, where the director, Dr. W. S. Gordon, has arranged a most attractive programme of inspection of work in progress at this important centre.

(To be continued)

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PERSONAL

Appointments.—The Colonial Office announces the promotion to the senior grade of Mr. F. W. Aston, M.R.C.V.S., D.V.S.M. (Vict.), and Mr. R. A. Hammond, M.R.C.V.S., Veterinary Officers, Kenya Colony, and the appointments of Col. J. C. Rix, M.R.C.V.S., and Mr. S. L. Trevor, M.R.C.V.S., as Veterinary Officers, Northern Rhodesia.

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Births.—Bowen.—On August 29th, 1946, at Carmarthen Maternity Hospital, to Tabitha (*née* Thomas) and John Bowen, M.R.C.V.S., of Garth, St. Clears, Carmarthenshire, a daughter—Ester Angharad.

Clark.—On September 2nd, 1946, at the Christiana Hartley Maternity Home, Colne, to Jean Dorothy, wife of John S. Clark, M.R.C.V.S., Stanley House, Colne, Lancs.—a daughter.

Evans.—On September 16th, 1946, at Middlesex Hospital, London, to Olive Winifred, M.R.C.V.S., wife of Kenneth G. D. Evans, M.R.C.V.S., Hampstead, N.W.3—a daughter (Carole Lynne).

Lang.—At Fairfield Nursing Home, Doncaster, to Dulcie, wife of W. Lang, M.R.C.V.S., on September 14th, 1946, a daughter, Penelope Elizabeth—both well.

Nisbet.—At the Fyfe-Jamieson Maternity Home, Forfar, on September 19th, 1946, to Rena Stratford (*née* Consitt), wife of James Nisbet, M.R.C.V.S., Easterbank House, Forfar—a daughter (both well).

Thomson.—On September 15th, 1946, at "Rose Dene," 10, Pannal Ash Drive, Harrogate, to Joan Scorer (*née* Bowett), wife of P. D. Thomson, M.R.C.V.S.—a sister for Alexander (Elizabeth Alice Downie).

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Marriages.—Boundy—Mather.—The wedding took place at St. Mathew's Church, Bankfoot, Bradford, on August 27th, 1946, of Terry Boundy, B.V.Sc., M.R.C.V.S., only son of Mrs. W. Boundy and the late Mr. W. Boundy, of Liverpool, and Phyllis Catherine, eldest daughter of the Reverend W. and Mrs. Mather, of Bankfoot, Bradford.

Dingle—Imrie.—On September 5th, 1946, at Corpus Christi Church, W.C.2, P. J. Dingle, M.R.C.V.S., younger son of Mr. and Mrs. R. J. Dingle, of St. Martin's Lane, London, to Miss J. M. Imrie, only daughter of the late Mr. H. Imrie and of Mrs. Imrie, of Parliament Hill Fields, London (formerly of Glasgow).

Furniss—Paternoster.—The wedding took place on August 31st, 1946, at St. Mary's Church, Theydon Bois, between Robert H. Furniss, M.R.C.V.S., second son of Mr. and Mrs. S. L. Furniss of Ashtead, Surrey, and Lorna L. Paternoster, B.Sc., only child of Mr. and Mrs. A. F. Paternoster of Theydon Bois, Essex.

Peters—Aitken.—On September 7th, 1946, at Holy Trinity Church, Ryde, E. Gerald Peters, M.R.C.V.S., of Corstorphine, Spencer Road, Ryde, to Enid (Judy) Aitken, younger daughter of L. A. Aitken, of London.

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Foot-and-Mouth:

Stirlingshire.—Bogton Farm, Larbert, Stirlingshire (Sept. 24th).

Swine Fever:

Hants.—Greys Farm, Lower Canterton, Bramshaw, Lyndhurst, Hants. (Sept. 19th).

Warwickshire.—Budbrook Bridge, Poultry Farm, Warwick (Sept. 18th); Piggeries, Wood Street, Bedworth, Warwicks (Sept. 19th).

Sheep Scab:

Derbyshire.—Grindolow House and Carr House Farm, Edall, Sheffield, Yorks. (Sept. 16th): Hill House Farm, Kinder, Hayfield, Stockport, Cheshire; Blagden View Farm, Ashopton, Sheffield, Yorks.; Town End Farm, Chelmorton, Buxton, Derbyshire (Sept. 19th).

NATIONAL AGRICULTURAL ADVISORY SERVICE

The following appointments to the post of Provincial Director have now been made and will take effect from October 1st, 1946:—

South-East Province.—Eric Rea, Esq., N.D.A., N.D.D., B.D.F.D., at present Agricultural Adviser to Messrs. R. A. Lister & Co., Dursley.

South-West Province.—Colin D. Ross, Esq., O.B.E., B.Sc., at present Executive Officer to the Devon War Agricultural Executive Committee (in place of W. T. Price, Esq., who has resigned on appointment as Principal of Harper Adams Agricultural College).

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FEEDING-STUFFS TO BE AUGMENTED FOR WINTER MILK

Reduction in Flour Extraction Rate

On Wednesday of last week, the Minister of Food, Mr. Strachey, stated that the flour extraction rate would be reduced from 90 to 85 per cent. on the following Sunday. In spite of the deplorable harvest weather in this country, there had been some improvement in our overall supply position of wheat. This improvement, while not sufficient to warrant the abolition of bread rationing, would permit the extraction rate of flour to be reduced.

"The primary purpose of this reduction is to help maintain our supplies of milk during the coming winter by increasing the quantity of animal feeding-stuffs. Rations for dairy cows will be adjusted as increased supplies of animal feeding-stuffs become available in the form of millers' offals. Details of the adjustment of the ration will be announced by the Ministry of Agriculture. Bread rationing, I repeat, will be removed immediately that it is safe to do so."

More Animal Rations

"The decision to reduce the wheat extraction rate of flour from 90 to 85 per cent.," observes *The Times*, "is the first reversal of the food austerity measures which the Government have introduced progressively since the early months of this year because of the world shortage of cereals. This is an indication that the outlook is now brighter. The wheat extraction rate was increased to 85 per cent. in March—as compared with an average rate of 73 per cent. before the war—and to 90 per cent. in May. These increases not only resulted in a darker loaf than at any time during the war, but so reduced milling offals as to cut down the home-produced supplies of animal feeding-stuffs by over 300,000 tons a year. This led to a drastic reduction of animal rations which the Minister of Agriculture deplored as 'a grievous blow to our reviving livestock industry.' The reduced wheat extraction rate now to be introduced will make available for the winter a substantial additional quantity of animal feeding-stuffs."

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NATIONAL SCHOOL OF HORSEMANSHIP

In establishing the National School of Equitation at Wingfield, near Ascot, the Institute of the Horse and Pony Club have embarked upon an enterprise which should command the support of horse lovers all over the country. It has been brought into being to fill an urgent need for a central school and authority on all matters pertaining to horsemanship since the Army school at Weedon no longer exists.

The school is large and well appointed, and Lt.-Col. G. C. Hurrell and his experienced staff have a good lot of, mostly young, riding horses of all types. The early courses will be for instructors.

It is estimated that it will cost £20,000 to maintain the school until it is a paying concern. Of that amount £4,000 has been subscribed by members of the Institute. All enquiries and subscriptions should be addressed to the Secretary of the Institute, 66, Sloane Street, London, S.W.1.

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LIVESTOCK POISONING FROM BURNING DUMPS

Approximately 1,200 cattle and 3,000 sheep are being collected at the Central Auction Mart, Stirling, to be removed to Edinburgh, for slaughter. These animals which come from 40 farms in the area lying between Kippen in West Stirlingshire and Callander in West Perthshire, states *The Scottish Farmer*, are the victims of the policy of disposing of smoke bombs and poison gas containers by burning in fires at the dumps in which they were stored during the war in the hills between Kippen and Fintry. In the early months of the year the fumes from the burning dumps began to descend on farms in the Carse of Stirling and the Forth Valley, and soon the cattle began to show signs of a sickness which caused many deaths and caused cows and ewes to abort. Even when the mothers survived they remained very weak and emaciated, and a number had to be slaughtered. Veterinary surgeons confirmed the views of the owners that the sickness was, in fact, due to the poison gas fumes from the dumps. War Office inspectors and experts also conducted *post-mortems*, and liability was eventually admitted by the War Department. At first it was thought that only about ten farms had been in-

volved in the disaster, but eventually stock from 40 farms were found to have been affected in some degree. Many of the cattle and sheep appear to be healthy enough, but they are being gathered in for slaughter from every farm where cases of poisoning occurred. This precaution is being taken to prevent cattle which appear to be quite sound but which may have been even slightly contaminated being scattered throughout the country *via* the sale rings. After the animals have been slaughtered the meat will be examined by Ministry of Food experts who will decide as to its disposal. Mr. James T. M'Dermont, auctioneer, of Live Stock Marts (Ltd.), Stirling, who was appointed valuer on behalf of the War Department and the farmers, has been engaged on the task of valuing the stock for the purposes of compensation.

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RUNNING POULTRY WITH ATTESTED CATTLE

"The question is frequently asked as to whether it is advisable to let poultry have free range on farms where an attested or licensed tuberculin tested herd is kept," states the Ministry of Agriculture in a recent announcement, which proceeds: "There is no prohibition on the keeping of poultry on such premises, but before the introduction of the comparative tuberculin test, owners were advised to segregate poultry from cattle, particularly if there was suspicion that the poultry flock was infected with tuberculosis. This precaution was advocated because avian tuberculosis, the only type found in poultry, is communicable to cattle. So far as is known, however, it does not cause progressive disease in cattle nor is it communicable to the milk supply, but animals which pick up the avian type of tuberculosis with grass or fodder may react to mammalian tuberculin. This tendency is of considerable importance when mammalian tuberculin alone is used for the tuberculin test. The employment for official purposes of the comparative tuberculin test, in which both avian and mammalian tuberculins are used, has, however, made it possible to determine whether a reaction is due to infection with bovine tuberculosis or to avian or other non-bovine infection. This development has enabled owners of attested and licensed tuberculin tested herds to undertake poultry keeping on an unrestricted scale. In certain circumstances, however, there are disadvantages in allowing poultry free range. Many importing countries will not accept animals unless they have passed a tuberculin test with mammalian tuberculin. As there is a risk that an animal infected with the avian type of tuberculosis may react to the test and be rejected, owners of cattle which may have to pass a test in which mammalian tuberculin only is used, would be well advised to segregate their poultry from their cattle."

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IMPORTATION OF CANADIAN HOLSTEINS

Farming journals have recently notified the importation into this country of a number of Canadian Holsteins (British Friesian cattle), and we are interested to learn, in this connection, that Colonel Graham Rees-Mogg, F.R.C.V.S., of Clifford Manor, near Stratford-on-Avon, has just received a six months old bull calf, whose 25 nearest dams averaged 21,167 lb. of milk: butter fat 4·18. Mr. R. W. Griffiths, the Woodlands, Forden, Montgomeryshire, has received a ten months old Friesian bull calf from a famous herd in Canada. The price paid was 1,355 guineas. Mr. Griffiths has also bought a Friesian yearling heifer from Canada for £2,600.

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THE KING TO PRESENT DAIRY HERD TROPHY

At a meeting of the Council of the Royal Agricultural Society of England, held in London, the President, Lord Bledisloe, announced that the King would attend the Society's reception at the Goldsmiths' Hall, on November 6th, to present the trophy to the winner of the inter-county dairy herd competition. The Society's gold medal for distinguished services to agriculture, awarded in 1942 to Lord Courthope, but hitherto unavailable, was presented. Preliminary arrangements for the Royal Show to be held next year at Lincoln from July 1st to July 4th were considered. Lt.-Col. W. Burrell, Knepp Castle, Sussex, was appointed a vice-president in place of the late Mr. William Everall. Eight new governors and 97 new members were elected.

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ROYAL SHOW NEXT YEAR

The Royal Agricultural Society of England will hold its next show at Lincoln from July 1st to 4th, 1947. The show will occupy 100 acres, and although it will have to be on austerity lines compared with shows held before the war the Society states that it will do its utmost to provide a worthy representation of livestock and displays of the new machinery which made possible the advance of British agriculture during the war. Special emphasis will be laid on the educational aspects of the show and the results of recent agricultural research.

The last Royal Show—the Society's centenary event—was held in Windsor Great Park in 1939.

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SCOTTISH HORSE-BREEDING FIGURES

"The return of licences issued for stallions to engage in breeding in Scotland, now issued, offers graphic evidence of the decline in this branch of stock husbandry," states the *Farming News*, and continues: "Whereas in 1937 total applications for licences exceeded 600, including 497 Clydesdales, the 1946 applications numbered only 367, of which 312 were in respect of Clydesdales. Thus the decline in the space of the past ten years is not far short of half.

"It might be assumed that the passing of the hackney horse has influenced these figures. But the hackney had almost vanished by 1937, the first of the decade under review. Only two hackneys were licensed in 1937, 1938 and 1939, since when no applications from this breed have been received. Shades of Mathias! There was a day when Scottish hackneys were world famous. Mathias, whose name we quote, was stud horse at Thornhome, Carluke, 40 years ago, and his stock in the hackney world had a predominance almost like Dunure Footprint's among the Clydesdales.

"Shetland ponies are in danger of going the same way as the hackneys. Whereas in 1937 there were 16 applications for 'Shelties' and the number in 1943 was seven, for this year, after a complete lapse last year, the number is only two.

"Of this year's total of 367 applications, covering all breeds of horses and ponies, only four, or 1 per cent., were refused licences. Three of the four refusals were Clydesdale, the remaining case being a Highland pony."

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QUARANTINE PROVISIONS

"The site of the London Quarantine Station, an absolute nece. for shipment of pedigree stock, particularly to South Africa, Australia and New Zealand, has been ear-marked for building," writes "Blythe" in *The Farmer and Stock-Breeder*, adding: "There is, I hear, no cause for immediate concern, but there is a possibility that the premises will have to be vacated within six months.

"The Ministry has always been most helpful in regard to exports and I have no doubt alternative accommodation will be made available to avoid any interruption with the overseas trade, which the Live Stock Export Group is doing so much to foster."

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The next meeting of the Farmers' Club (at the British Empire Society's rooms, Craven Street, W.C.2), will be held on October 7th, when a paper on improvement of hill lands will be read by Captain A. R. Dougall, of Berwick.

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The London Scientific Film Society, 34, Soho Square, London, W.1, has booked the Scala Theatre, Charlotte Street, W.1, for ten Sundays in the next ten months and will show scientific and documentary films afternoon and evening.

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Members of the Welsh Branch of the National Union of Teachers, at their annual meeting in Cardiff, passed a motion impressing upon the Court of the University of Wales the need for preparing a scheme immediately for submission to the Government for a full faculty in veterinary science as an integral part of the University. The Union, it was stated, was preparing a memorandum on such a scheme for submission to the University Court.

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Dr. W. J. Hall has succeeded Dr. S. A. Neave as Director of the Imperial Institute of Entomology. He has had much entomological experience in Egypt and South Africa.

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H.M. STATIONERY OFFICE PUBLICATIONS

The undermentioned have been published recently. Copies can be purchased through any bookseller, or directly from H.M. Stationery Office.

AGRICULTURE AND FISHERIES, MINISTRY OF:

Leaflet, Advisory No. 325. Pulpy Kidney Disease.
Each 0 1 0 2
Dozen 0 9 0 11

HEALTH, MINISTRY OF:

Public Health. Report of the Chief Medical Officer of the Ministry of Health on the State of the Public Health During Six Years of War, 1939-45 ... ... 5 0 5 4